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**4.0 Interconnection Requirements****4.1 General Design Considerations**

Interconnecting Customer shall design and construct the Facility in accordance with the applicable manufacturer's recommended maintenance schedule, in compliance with all aspects of the Company's Interconnection Tariff. Interconnecting Customer agrees to cause its Facility to be constructed in accordance with applicable specifications that meet or exceed those provided under this Section of the Interconnection Tariff.

**4.1.1 Transient Voltage Conditions**

Because of unusual events in the Company's EPS, there will be transient voltage fluctuations, which will result in voltages exceeding the limits of the stated ranges. These transient voltage fluctuations, which generally last only a few milliseconds, arise due to EPS disturbances including, but not limited to, lightning strikes, clearing of faults, and other switching operations. The magnitude of transient voltage fluctuations varies with EPS configuration, grounding methods utilized, local short circuit availability, and other parameters which vary from point-to-point and from time-to-time on the distribution EPS.

The fluctuations may result in voltages exceeding the limits of the stated ranges and occur because of EPS disturbance, clearing of faults and other switching operations. These unavoidable transients are generally of too short duration and insufficient magnitude to have any adverse effects on general service applications. They may, however, cause malfunctions in equipment highly sensitive to voltage changes, and protective devices may operate to shut down such devices. The magnitude, duration and frequency of transient fluctuations will vary due to EPS configuration and/or circuit arrangement. In addition, disturbances of indeterminate magnitude and duration may occur on infrequent occasions due to short circuits, faults, and other unpredictable conditions. Transient voltages should be evaluated in the design of the Facility.

**4.1.2 Noise and Harmonics**

The introduction of abnormal noise/harmonics can cause abnormal neutral current flow, and excessive heating of electrical equipment. Harmonics may also cause distortion in TV pictures, telephone interference, and malfunctions in digital equipment such as computers. The permissible level of harmonics is dependent upon the voltage level and short circuit ratio at a given location. IEEE Standard 519 provides these levels at the point of common coupling. In requiring adherence to IEEE 519 the Company is not making a recommendation regarding the

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level of harmonics that a given piece of equipment can tolerate nor is it making a recommendation as to the permissible level in the Interconnecting Customer's Facility.

**4.1.3 Frequency**

The interconnected electric power system in North America, which is maintained at 60 hertz ("Hz") frequency on its alternating current services, is subject to certain deviations. The usual maximum instantaneous deviation from the standard 60 Hz is  $\pm 2/10$  cycle  $\pm (0.33\%)$ , except on infrequent occasions when the deviation may reach  $\pm 1/10$  cycle  $\pm (0.17\%)$ . The usual normal deviation is approximately  $\pm 1/20$  cycle  $\pm (0.083\%)$ . These conditions are subject to occur at any time of the day or night and should be considered in the design of the Facility. All are measured on a 60 Hz base.

**4.1.4 Voltage Level**

All electricity flow across the PCC shall be in the form of single-phase or three-phase 60 Hz alternating current at a voltage class determined by mutual agreement of the Parties.

**4.1.5 Machine Reactive Capability**

Facilities less than 1 megawatt ("MW") will not be required to provide reactive capability, except as may be provided by the retail rate schedule and Terms and Conditions for Distribution Services under which the Customer takes service.

Facilities greater than or equal to 1 MW interconnected with the Company EPS shall be required to provide reactive capability to regulate and maintain EPS voltage at the PCC as per NEPOOL requirements. The Company and NEPOOL shall establish a scheduled range of voltages to be maintained by the Facility. The reactive capability requirements shall be reviewed as part of the Impact Study and Facilities Study.

**4.2 Protection Requirements For New or Modified Facility Interconnections with the EPS****4.2.1 General Requirements**

Any Facility desiring to interconnect with the Company EPS or modify an existing interconnection must meet minimum specifications, where applicable, as set forth in the following documents and standards and requirements in this Section.

- IEEE P1547 Standard for Distributed Resources Interconnected with Electric Power Systems.